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ABSTRACT

This paper discusses the systematic approach to the integration of microcomputers into all phases of instruction that was implemented in the Los Angeles Unified School District in 1984 under the Computer Education Foundation Program (CEFP). It begins with a brief description of the school district to provide a context for the reader. The current literature is then reviewed, including a study of the impact of state funding for the adoption of technology under California Assembly Bill 803 in Los Angeles County. An outline of the CEFP plan includes brief descriptions of the computer education program at the elementary, junior high, and senior high school levels; the time table for phasing in the program in district schools; and both instructional and staff development activities. Discussions of constraints which have surfaced during the four years of implementation focus on size and logistics, articulation, consistency, and decision-making. Recommendations and conclusions address issues related to coordination, decision-making, training, and articulation. (11 references) (EW)

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Challenges of Computer–Based Instruction in the Los Angeles Unified School District

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Challenges of Computer–Based Instruction in the Los Angeles Unified School District

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Introduction

Although microcomputers have been used in Los Angeles Unified School District classrooms for over ten years, in 1984, the Computer Education Foundation Program (CEFP), under the auspices of the District's Office of Instruction, implemented a systematic approach to integrating microcomputers into all phases of instruction. This plan resulted from the publication of *Computer Literacy and the Use of Microcomputers in Instruction*, a needs assessment and position statement written by Dr. Robert Baker and Dr. James Taylor (1984). The use of microcomputers in the schools was, for the most part, left up to the individual school or teacher prior to the CEFP.

This paper will discuss several important topics: First, the Los Angeles Unified School District will be described to provide a context for the reader. Second, current literature will be reviewed. Third, the CEFP plan will be outlined. Fourth, the constraints of the implementation of computer–based instruction in the schools will be discussed. Finally, future directions and recommendations will be offered.

Background

The Los Angeles Unified School District, the second largest public school district in the United States with 644 schools, covers a total area of 708 square miles. There are approximately 600,000 students and over 29,000 teachers. The District is divided into eight geographic regions that include elementary and junior high schools, and four divisions, the senior high schools, special education, adult education, and child care. The responsibility for computer–based instruction falls into the domain of two central administrative offices. The Office of Instruction is charged with integrating computers into all phases of instruction, and the Information Services Division manages all administrative applications of computers. In addition, the Human Resources Development Branch works with both of these offices to develop computer training programs.

Related Literature

The number of microcomputers in schools throughout the United States has increased from 292,000 in 1982 to approximately 1.4 million in 1986 (InfoWorld, April 14, 1986). The number of microcomputers has doubled every year since 1984 (Bork, 1987). *Electronic Learning Magazine*'s sixth Annual Survey of the States reported that 96% of all public schools in the United States had microcomputers (1987). California has been a leader in this growth.

Mothner (1987) states that it is moot to ask in the 1980's whether or not the computer ought to be used in education. The critical question is how to use computers effectively in educational programs. The National Council of Teachers in Mathematics (1980) stresses computer literacy as an essential outcome of contemporary education. All students need firsthand experiences with both the capabilities and limitations of computers. Until the 1980s, computers–based instruction focused on teaching about the computer itself, not about how to use the computer in all areas of the curriculum. During the past three years, this focus has shifted so that educators are now perceiving the computer as an important tool for supporting instruction across all content areas.

In "Policy Recommendations for Developing Appropriate Uses of Technology in California Schools", an unpublished study, Pogrow (1987) discusses several problems with the current direction of technology use in California.

Pogrow first focuses on the common practice of "diffusing technology as widely as possible," i.e., teaching every grade level and every classroom, sacrificing quality implementation and minimizing opportunities to enhance student learning. Pogrow focuses next on the restriction schools experience on the range of educational practices that can be implemented. Because most instructional strategies related to computer education have not been validated by research, and because the diffusion network throughout California is so broad, the harm done to education is probably equal to the good accomplished in the schools. Pogrow then bemoans "widespread training in widely advocated but unproven techniques." Many of the instructional strategies in use are not validated by research, yet the training provided in these strategies is widespread and readily available. Finally, Pogrow criticizes the lack of interest in the proven technology of distance learning, e.g., instructional television, satellite transmissions, and others, which has tremendous educational implications. Computer technology, only one of many forms of technology with potential educational applications, has received most of the attention.

Pogrow makes several recommendations. First, California needs to make more targeted use of pilot projects with careful evaluation procedures. Second, educational leaders should provide technology selectively to teachers who have the desire and ability to use it most effectively. Third, Pogrow advocates emphasizing methodologies for 'teaching as a process.' Fourth, Pogrow stresses improved curriculum development techniques. Fifth, he believes that California should empower Teacher Education and Computer Centers (TECC) to work with general education

evaluators. Sixth, TECC staff should be trained in the importance of avoiding specialization and building on the general use of technology to enhance learning. These two recommendations are moot since the TECCs closed in July, 1987, as a result of extensive state budget cuts. Finally, Pogrow recommends developing stimulating new uses of technology, e.g., distance learning and telecommunications.

The explosion of technology in California schools was triggered by Assembly Bill 803, state legislation which provided guidelines and funding for the adoption/adaption of technology across the state. Wulf (1987), in studying the impact of AB 803 funding in Los Angeles County, delineated four major areas of inquiry:

1. To identify factors to explain the variation of success of AB 803 implementation, particularly with regard to the implementation of technology in the classroom.
2. To sample and analyze perceptions about the relative impact of AB 803 on classroom instruction.
3. To identify the range of new technologies now available in school instruction as a result of AB 803.
4. To develop baseline data for making recommendations regarding staff development for teachers and administrators in planning and implementing new technology.

Wulf's findings are as follows:

1. Equipment, mostly computer systems and printers, was introduced to sites that did not have any prior to AB 803.
2. Schools reporting successful implementation of programs funded by AB 803 shared specific characteristics related to student and teacher behavior. These schools reported a high level of teacher motivation; a high level of staff training; improved student test scores; critical thinking/problem solving as the area in which technology is most successfully utilized; and use of technology to teach new concepts.
3. Teacher competence in the use of technology in the classroom situation was an important factor in the implementation of AB 803. Schools reported the follosing: positive teacher and principal attitudes toward the AB 803 project; a high commitment to AB 803 goals by both teachers and principals; substantial enough funding to achieve stated goals; and a low level of difficulty in implementation. In addition, students' achievement on criterion tests improved rapidly as the result of AB 803 project implementation because of the change in instructional activities.

Wulf makes the following recommendations:

1. Provide assistance to local sites to focus proposals on specific instructional objectives for student and teacher outcomes.
2. Provide the opportunity for local site ownership by administration and faculty.

3. Provide for necessary staff development both in quality and quantity.

Los Angeles Unified School District Computer Education Program

The District Computer Education Foundation Program, begun in 1984, is divided into elementary and secondary level components. At the elementary school level, the computer education program begins in the fifth grade and emphasizes mathematical concepts using the computer language, LOGO, and language arts concepts, using the word processor in the commercial software package *AppleWorks*. In addition, computers are integrated into as many subject areas as possible, and after-school computer clubs provide for enrichment activities. At the secondary level, a District *Continuum of Skills* establishes a course of study for junior high and senior high students. Included are course outlines for Introduction to Computers, a required course at the junior high level, and optional courses in programming and information processing. Additional elective classes include computer programming, Advanced Placement computer science, word processing, data processing, and digital computer technology.

Before the CEFP was implemented, each region established a training center consisting of sixteen computers. These sites served as local training sites for teachers and administrators.

Because of the District's size, each year, beginning in 1984, one–third of the schools were phased into the program, with hardware and software provided for every fifth grade classroom, and fully equipped computer laboratories at junior and senior high schools. School selection criteria during 1984–85 included the following: schools willing to participate, recipients of Chapter I funding, largely minority schools, year round schools, schools with existing, but limited, hardware, and schools with grade level continuity between elementary and secondary levels. During 1985–86, another one–third of the District's schools were included, with the final one-third included in 1986–87. Staff development has been provided for both administrators and teachers as part of the implementation. In addition, a District Task Force has monitored and has evaluated all aspects of the program.

Phase I of the CEFP was completed at the conclusion of the 1986–87 school year. Implemented during the 1987–88 school year, Phase II seeks to broaden the use of microcomputers to support instruction by centering on school level instructional development projects. These projects, in turn, will serve as models for possible districtwide expansion of computer use in instruction. At the elementary level, additional staff development will be provided using a training of trainers format. In secondary schools, support is continuing for all school based computer teachers. Staff development topics for Phase II stress infusing all areas of instruction with computers, with emphasis on language arts and mathematics at the elementary level, and with language arts and writing at the secondary level.

The priorities for instructional development projects are as follows: developing a sixth grade

writing project, an elementary mathematics project, a bilingual/ESL computer based writing project, a secondary writing project, and a secondary journalism–graphics arts project. Additional staff development opportunities are being provided for teachers at participating schools.

In addition to the Computer Education Program, the Los Angeles Unified School District Human Resources Development Branch has been conducting extensive staff development classes in computer education. During summer, 1987, over 40 computer related inservice classes were held throughout the Los Angeles area with over 800 participants. Also, each region/division throughout the District has conducted its own extensive inservice training in a variety of areas, one of which is computer education.

The Computer Education Foundation Program has been very successful. Every school in the District now has uniform hardware and software standards with staff development and inservice programs based on these standards. In secondary schools, the program has been particularly effective because there is a teacher available who has specialized in computer instruction.

Constraints/Observations

The findings by Wulf (1987), Pogrow (1987), and others underscore constraints which surfaced during the past four years of implementation of computer–based education in the Los Angeles Unified School District, providing significant topics for consideration.

Size and Logistics

The first major constraint concerns the sheer size of the District and the concomitant logistical issues that result. Such constraints include alterations to schools, equipment setup, security, training staff, implementation monitoring, and impact evaluation. Each year one–third of the schools have participated in the implementation of the CEFP, over 200 schools. Schools were chosen, not by geographic region, but on the basis of established criteria described previously. Each secondary school required extensive alterations to the school plant. These alterations involved adjustments in electrical wiring, installations of security windows and doors, of new furniture, and of new door locks. The quality of implementation suffered because of the urgency to equip all of the schools, exemplifying Pogrow's concern about sacrificing quality for quantity. For instance, there were quality control problems with alterations, equipment, and software.

School staffs were given only one sixteen–hour staff development session and were presumed to be competent to use the new technology immediately with their students, contrary to the research findings of Fuller (1969), Hall (1975), and others that adopting an innovation is a slow process, frequently taking three to five years for full implementation. While there were additional opportunities for staff to receive additional training, in many instances, they did not.

Upon returning to their classrooms, with only sixteen hours of training, many teachers did not feel comfortable with the hardware and software. The result was that materials were not used appropriately, frustration resulted, and in some instances, the use of the technology was discontinued, underscoring Pogrow's conclusion that mass diffusion of computer education in schools is a noble idea in concept only.

Articulation

The second constraint is articulation. There was often a lack of continuity between the participating secondary schools and their feeder elementary schools. Part of the problem centered in the selection process, precluding the selection of a complete set of schools, i.e., feeder elementary, junior high, and senior high. With different schools participating in different years, it was apparent that the schools would be at different levels of implementation. Additionally, the teacher and administrator turnover rate at schools, which could be quite high at some of the large urban schools, further limited articulation. Thus, the initial program design contributed confusion. It may have been advantageous, in each region/division, to identify a small cluster of schools that was relatively stable and to conduct intensive training and development of the computer education program. Working on a smaller scale, with close and systematic articulation between each school cluster, would have provided a much more controlled environment in which to monitor and assess implementation of the program.

Consistency

The third constraint is consistency. There are many units within the District that conduct their own distinctive computer education programs. The CEFP conducts staff development sessions. The regions/divisions hold inservice classes to supplement CEFP programs. The Human Resources Development Branch conducts extensive inservice activities on an individual basis and in cooperation with the CEFP and regions/divisions. Outside vendors conduct their own training sessions to familiarize District staff with their hardware and software. The Computer Using Educators organization also offers programs. The list goes on. The result is that, while there is a potpourri of activities available to teachers, there is a lack of consistency districtwide. Again, inservice has wide diffusion without equally wide quality implementation. The District intended, with the formulation of the policy to provide for the CEFP, quality implementation with mass diffusion. However, in a District as massive as the Los Angeles Unified School District, what has resulted has been more of a focus on quantity rather than quality.

Decision–Making

The fourth major constraint is the decision–making process itself. There are many levels of

decision–making units within the District. Therefore, before any final decision is made, data are gathered from a wide variety of sources. The data are then assessed, policy formulated, approved by the Board of Education, and finally, implemented. It can take many weeks from the time data are gathered until the Board acts. The purchasing of a standard hardware package for the schools can provide an example. State law mandates that a bid process be employed when such large scale purchases are made. Vendors such as IBM, Apple, and Tandy, submit hardware for evaluation by District staff. After evaluation, recommendations are made to the Office of Instruction, which reviews, refines, and sends the recommendations to the superintendent who further refines the report for Board consideration. After careful analysis and many hours of testimony by District staff, the Board makes the final decision. This process, which allows for input by District staff, is comprehensive, thorough, and time consuming.

Recommendations and Conclusions

Coordination

Several recommendations for improving the quality of implementation of computer–based instruction in the Los Angeles Unified School District can be made. First, one unit or branch empowered with the responsibility of administering computer–based instruction throughout the District, with equal representation from instruction, information services, human resources and region/division staffs, would streamline implementation of computer–based instruction. Such centralization would provide coordinated effort from all parties involved, and ensure quality implementation, articulation, consistency, and timely decision making. In addition, this unit could address the issues presented by Wulf (1987). First, this unit could assist schools to focus on specific instructional objectives by helping schools to conduct an individualized needs assessment. A key element in schools qualifying for an AB 803 grant, the needs assessment revealed a wide variety of needs, emphasizing the fact that schools differ. In fact, of the schools participating in computer–based instruction, only those schools which applied for AB 803 funding conducted needs assessment as part of the grant application process.

Decision–Making

The second recommendation relates to the decision–making process. Because hardware and software represent a high cost area, the purchasing process could be refined to maintain current thoroughness and to reduce time consuming steps. The central unit charged with administering computer–based instruction, as proposed above, can be charged with establishing committees to evaluate technology–related purchases, calling upon those with expertise to serve as consultants. There is already a precedent for such a system in the District. When districtwide policies are under

consideration, the region/division Directors of Instruction often select representatives to serve on committees. In the past, this was not done for computer–based instruction. The Office of Instruction's CEFP and the Information Services Division were the two administrative branches which scrutinized hardware and software purchase orders and participated in such decision–making capacities. There were teachers and administrators selected to serve on the committees, but input was not districtwide. Although such a committee with members from each geographic region would be cumbersome, considering the diverse nature and size of Los Angeles Unified School District, adequate representation would provide needed thoroughness. Committees such as these serve in other capacities, e.g., textbook evaluations and mentor teacher selection. As a microcosm of the District, such a committee could make important and timely decisions.

Training

The third recommendation focuses on training. Wulf (1987) recommends sufficient staff development, both in quality and in quantity. Again, basing this recommendation on individual school needs would ensure local school application of the total program. Computer–based instruction training must be planned, conducted, and evaluated, in a collaborative manner, considering the needs of each school, focusing on objectives proposed by the school staff, and coordinated by the unit charged with providing the training. Again, having a central unit charged with such coordination ensures that the needs of each staff member at the school are met. Needs assessment and consistency in the training can thus provide necessary scaffolding for the instructional program at each participating school.

Articulation

Articulation is the final area of consideration. Continuity between elementary and secondary schools is a critical factor contributing to the success or failure of the total instructional program. A comprehensive approach with workshops, staff development, meetings, etc., can provide opportunities for staff members to work on articulation. While this has been done on a limited basis in other content areas such as mathematics, language arts, and social studies, it is even more important with computer–based instruction because of the speed at which technology is developing and permeating instruction in all content areas. Board policy must be adopted and sufficient funds allocated to provide the kind of training imperative for all students in the 1990's. Such training must also focus on other important related areas as well, e.g., team building, leadership, and decision making. A total District effort is needed to ensure efficient infusion of technology throughout the curriculum and for managing information.

During the past four years, computer based instruction has been integrated into all areas of the curriculum in the Los Angeles Unified School District. While every school in the District now

has computers, printers, and videocassette recorders, the degree of implementation varies not only by region/division, but by school. Wulf (1987) found that such factors as teacher morale, administrator involvement, and training, differentiated schools with a high degree of implementation of computer–based instruction from those that had a low degree of implementation. A coordinated effort to provide consistent, uniform, and efficient integration of computer–based instruction into our schools could provide all students with equal access to quality education.

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